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ROASTER FOR COFFEE BEANS, ETC.

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ROASTER FOR COFFEE BEANS, ETC.

[Coffee mame to no hosenki]

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[There are no amendments in this translation.]

Claim

1. Roaster for coffee beans, etc., characterized by being equipped with: a roasting chamber (1) in a structure for first heating the outer wall of the roasting chamber (1) for radiant heating by the hot air for convection heating coffee beans, etc., supplied to the roasting chamber (1) that has a discharge hole (8) for coffee beans, etc., at the central lower end, and has a channel separation cylinder (13) arranged in the central part, and blowing the hot air into the lower end of the channel separation cylinder (13), which is positioned at the center of the roasting chamber (1), from an exhaust hole (7) in the periphery of the discharge hole (8) for coffee beans, etc., at the central lower end of the roasting chamber (1) to have the coffee beans, etc., convection heated by flowing and circulating them; a blower (3) that supplies the hot air to it; and a heater

(2), a glass pipe (14) that has a show effect, etc., is arranged above the roasting chamber (1), the exhaust is discharged by a cyclone separator (19) or a filter, etc., by separating chaff, and coffee beans, etc., that have completed roasting are taken out into a cooler (22) through the discharge hole (8) at the central lower end of the roasting chamber (1).

Detailed explanation of the invention

Industrial application field

This invention concerns a roaster for coffee beans, etc. In more detail, coffee beans, etc., are roasted to eliminate bitterness and astringent taste and bring out the flavor and aroma of coffee beans, etc. However, it is understood that the same fresh beans can create a variety of flavors by the way they are roasted, thus the roasting process is a very delicate and complicated process. This invention offers a roaster for coffee beans, etc., that allows for elaborate control for attaining the roasting intended by the user.

Prior art

Various types of roasters for coffee beans, etc., have been proposed formerly. The main prior art and its problems, etc., will be described below. First, the method of heating coffee beans in conventional jet roasters is by the transfer of convection (jet) heat only, which has a large heat loss to the outside air through the wall of the convection chamber, and the hot air including the energy for that heat release must supply energy to the beans, which requires hot air at high temperature. As a result, the uniformity in the surface temperature and the central temperature of beans is poor, and the heat efficiency is also poor.

In a conventional jet roaster that does not have a channel separation cylinder, coffee beans that ascend and descend interfere with each other when circulating coffee beans by a jet, which creates the energy loss when channels are interfered with and require a large kinetic energy of air. In other words, a large amount of air is necessary. When the amount of air increases, the exhaust gas loss increases, which not only deteriorates the heat efficiency but there is also the disadvantage of having a large cooling system for connecting the exhaust gas to a building duct. When the amount of air for the jet is controlled excessively, the air flows difficultly because of the resistance of the coffee beans, which decreases the amount of air passing through the heater, and there is the problem of a short life span of the heating wire due to an abnormal increase in the temperature of the air and the temperature inside the heater.

Concrete examples of the prior art include 'coffee roasting method and its system' (Japanese Kokoku Patent No. Sho 55[1980]-46705), with a technique 'to provide a flotation motion that has a double swirl locus of horizontal swirling that forces the ascending motion and vertical swirl that forces the descending motion to coffee beans by the supply of hot air to the

main part ···', 'roaster for coffee beans' (Japanese Kokoku Utility Model No. Sho 58[1983]-10465), which indicates a technique 'in which a funnel-shaped roasting container that has a wire net provided at the bottom part is provided to the system in an attachable and detachable manner, an air blower and a blast heater are installed inside the system, they are structured so that the hot air from said blast heater passes from the bottom part of the roasting container up through the said container, an exhaust air passage, which can be connected to the opening of at the upper part of the roasting container, is provided at the upper part of the system, and a dust-collecting bag is provided at the opening of the said exhaust air passage', 'roaster for coffee beans' (Japanese Kokoku Utility Model No. Sho 61[1986]-35037) that has a structural requirement 'in that it is equipped with: a funnel-shaped roasting container that has a heat-resistant filter provided at the opening part at the lower end and can be attached and detached to the system in an upright manner; an air blower that is provided inside the system; a blast heater that heats the hot air to the drying and roasting temperatures of coffee beans and sends it upwards into said container from the lower end of the roasting container; an exhaust passage that is provided at the upper part of the system and connected to the upper end of the roasting container in an attachable and detachable manner and forms a passage for the exhaust that passes through the roasting container; a dust collecting container that is provided in an area in an attachable and detachable manner; an exhaust opening that sends the exhaust that passes through the dust collecting container to the outside of the system; a timer that sets up the roasting time of the coffee beans inside the roasting container and operates the air blower and the blast heater; and a temperature controlling mechanism, which controls the operation of the blast heater and controls the temperature of the hot air that passes through the roasting container', as well as 'roasting method of coffee beans and its system' (Japanese Kokai Patent Application No. Sho 57[1982]-110146), which is a technique 'with the characteristic in which coffee beans in a specific amount are put into an upright funnel-shaped roasting container, hot air is sent from the lower end of the said container and the coffee beans inside the container are swirled up and down by the aforementioned hot air, and the temperature of the hot air is adjusted', 'roaster for coffee beans' (Japanese Kokoku Patent No. Sho 56[1981]-19986), which discloses 'a coffee roaster, which is a coffee roaster for roasting fresh coffee beans, that allows for the detection of roasting and the roasting completion of coffee beans put into the coffee roaster and the detection of cooling and the cooling completion in a complete, continuous process within one chamber by a temperature sensing element that is inserted among coffee beans during stir-roasting', and furthermore 'roaster' (Japanese Kokoku Utility Model No. Sho 62[1987]-42718), which is 'a roaster with the characteristic in which one side of a straightening plate that has many through-holes is supported between a combustion chamber equipped with a burner and a roasting chamber above it in a manner so that it can freely have an angular displacement around the

horizontal axis of rotation, which allows for a vertical position of this straightening plate for the material to remain and an inclined position for the material to discharge, and a material fall preventing plate, which is continuously in contact with the upper face of the straightening plate, is provided in a manner so that it can freely change the position vertically'. However, none of these techniques offer a roaster that enables an accurate control and uses the convection heating in combination with radiant heating and the channel separation cylinder for enabling the above in this invention as one of the mandatory structural elements.

Problems to be solved by the invention

This invention attempts to solve all of the disadvantages and problems possessed by prior art mentioned above, and its characteristic for a jet method roaster that uses a glass pipe for increasing the show effect at a store front, like a coffee shop, for example, in which it is necessary to decrease the amount of air for the jet in order to increase the heat efficiency and decrease the energy consumption amount, but the flow of coffee beans decreases when the air amount from the jet is decreased, and the show effect of the roasting ability as the characteristic of a jet method roaster also decreases, is to offer this invention for solving these problems entirely and enables both the energy conservation and the show effect at the store front and furthermore allows for an accurate roasting.

In this invention, in the structure in which the bean stopping part provided below a jet method roaster is structured as a cylindrically or bottle shaped radiant heating chamber, and the jet air is discharged up from the central lower end, coffee beans are blown up loaded on the jet in the central part (initial injection speed of 20~200 m/sec), receive convection heating during this, and then fall into the radiant heating chamber along the outer wall and receive radiant heating, blown up again from the central part and receive convection heating, and this is repeated. When compared to the conventional simple jet method, in this invention in this manner, the comprehensive heat transfer rate for the combined radiation and convection is increased by providing the radiant heating chamber for the combined use of convection heating with radiant heating, which reduces the temperature difference between the hot air and the coffee beans, increases the uniformity of the temperature of coffee beans so that the coffee beans are not subject to a temperature differential, a more accurate roasting is made possible through the attainment of the control of the roasting time and the temperature control. Then, in this invention, a channel separation cylinder is arranged in the jet part, the inside of the cylinder is used as the ascending path of the beans (speed of the air in the cylinder at 4~60 m/sec), and the outer side is separated as the descending path, which attains a reliable flow of coffee beans and augments the show effect at the store front, and it also reduces the energy required for the flow. The uniformity in the temperature of beans also improves as the flow increases. The radiant heating chamber in

this invention utilizes the radiant heat at 100~300°C for heating coffee beans, which provides roasting in a far infrared radiation region that allows for a sufficient arrival of the heat to the core of a coffee bean. Accordingly, a reduction in the temperature difference between the surface and the core part of a coffee beans can be attained, in other words, it is possible for the temperature inside one coffee bean to approach uniform temperature. Furthermore, this invention also has a characteristic of attaining a very good-quality roasting without roasting (toasting) chaff (shells) together with coffee beans because chaff (shells) can be reliably eliminated through the jet, for example. In addition to coffee beans, soy beans, sesame seeds, oriental crackers, Ghana beans, and peanuts, etc., can also be targets of the adaptation for the roasting in this invention. In their concrete adaptations, this roaster can be used by just changing the soft aspects, such as the air capacity, temperature, and the time, for example. In the specifications of this invention, they will be comprehensively indicated simply as coffee beans below.

Next, the flow path of coffee beans is physically separated between the ascending path and the descending path in this invention, and a reliable flow can be obtained in a smaller air amount than before. A reduction in the amount of air necessary for the flow not only reduces the facility capacity for the blower and heater, for example, but it also reduces the amount of exhaust gas, which reduces the heat loss of the exhaust gas, and increases the heat efficiency for that amount. Furthermore, it is also linked to a reduction in the size of the exhaust gas cooling system for the discharge of the exhaust to building ducts, etc.

The object of this invention that has such a characteristic is a roaster for coffee beans, etc., characterized by having a roasting chamber in a structure for first heating the outer wall of the roasting chamber for radiant heating by the hot air for convection heating coffee beans, etc., supplied to the roasting chamber that has a discharge hole for coffee beans, etc., at the central lower end, and has a channel separation cylinder arranged in the central part, and blowing the hot air into the lower end of the channel separation cylinder, which is positioned at the center of the roasting chamber, from an exhaust hole in the periphery of the discharge hole for coffee beans, etc., at the central lower end of the roasting chamber to have the coffee beans, etc., convection heated by flowing and circulating them; a blower that supplies the hot air to it; and a heater, a glass pipe for a show effect is arranged above the roasting chamber, the exhaust is discharged by a cyclone separator or a filter, etc., by separating chaff, and coffee beans, etc., that have completed roasting completed are taken out into a cooler through the discharge hole at the central lower end of the roasting chamber.

Application example

This invention with such a characteristic will be concretely explained in accordance with a side view diagram of the application example attached below.

Figure 1 is an explanatory diagram that indicates a roaster for coffee beans, for example. This system has a structure that has a blower (3) for supplying hot air to a roasting chamber (1), electric heater (2), a roasting chamber (1) that has an exhaust hole (8) at the lower part and has a channel separation cylinder (13) arranged in the center, glass pipe (14) above it, as well as a hopper for coffee beans (16) that has a shutter (17) above it, a cyclone separator (19) or filter, etc. (not shown in the illustration) that has a chamber (15) that supports it arranged and also has an exhaust hole (21) for separating chaff after an exhaust passage (18), a cooler (22), which is connected to the exhaust hole (8) at the lower part of the roasting chamber (1), and a controlling system.

An actual application example of the roaster in this invention will be explained. First, fresh coffee beans in a predetermined amount, for example are put into the roasting chamber (1) through the projection hopper (16) by opening the shutter (17), and the shutter (17) is closed. The air that is sent from the blower (3) is heated to a specific temperature by the electric heater (2), guided to the jacket part (4) of the roasting chamber (1) through a duct (6), and after heating the outer wall (5) of the roasting chamber (1), jetted upwards into the inside of the channel separation cylinder (13) positioned in the central part inside the roasting chamber (1) from the jet hole (7) positioned at the periphery of the exhaust hole (8) at the lower end of the roasting chamber (1). The fresh beans that are loaded on the jet ascend while receiving convection heating in the inside of the channel separation cylinder (13) by this jet, are blown up to the upper part of the channel separation cylinder (13), and descend through an annular path (1) that consists of the glass pipe (14) and the channel separation cylinder (13) towards the roasting chamber (1). (This state can be watched through the glass pipe (14), and the show effect at a coffee shop, etc., can be displayed). Inside the roasting chamber (1), they descend down the annular path (11) that consists of the outer wall (5) of the roasting chamber (1) and the channel separation cylinder (13), receive radiant heating, pass to the inside of the channel separation cylinder (13) at the lower end of the roasting chamber (1), receive convection heating while being loaded on the jet again and ascend the inside of the channel separation cylinder (13), this is repeated, and uniform roasting in an intended state will be obtained.

The exhaust of the hot air used for roasting is discharged through the discharge hole (21) after ejecting the chaff (shells) that have separated from coffee beans and garbage, etc., into the chaff receiver (20). Coffee beans that have completed roasting are discharged through the exhaust hole (8) when the exhaust valve (9) opens and then cooled.

Effect of the invention

Although the serious disadvantages and problems in roasting of coffee beans described above were pointed out with the prior art as a result of using only the convection heat transfer as

the heating method of coffee beans and not including the channel separation cylinder in the system as in this invention, this invention, as a result of the structural requirements above as used in the structure in this invention, is an invention that allows for roasting of coffee beans, etc., with the attainment of an accurate control as intended by the user, which was considered completely impossible in the prior art, as a result of the combined used of the convection heating and radiant heating in the heating method, and the formation of the channel separation cylinder that allows for it inside the roaster as one of the mandatory requirements of the structure.

Brief description of the figure

Figure 1 is an explanatory diagram that indicates an application example of the roaster for coffee beans, etc., in this invention.

(1)…roasting chamber, (2)…electric heater, (3)…blower, (4)…jacket part, (5)…outer wall, (6)…duct, (7)…jet hole, (8)…exhaust hole, (9)…exhaust valve, (10) (11)…paths, (13)…channel separation cylinder, (14)…glass pipe, (15)…chamber, (16)…projection hopper, (17)…shutter, (18)…exhaust passage, (19)…cyclone separator, (20)…chaff receiver, (21)…exhaust hole, (22)…cooler.

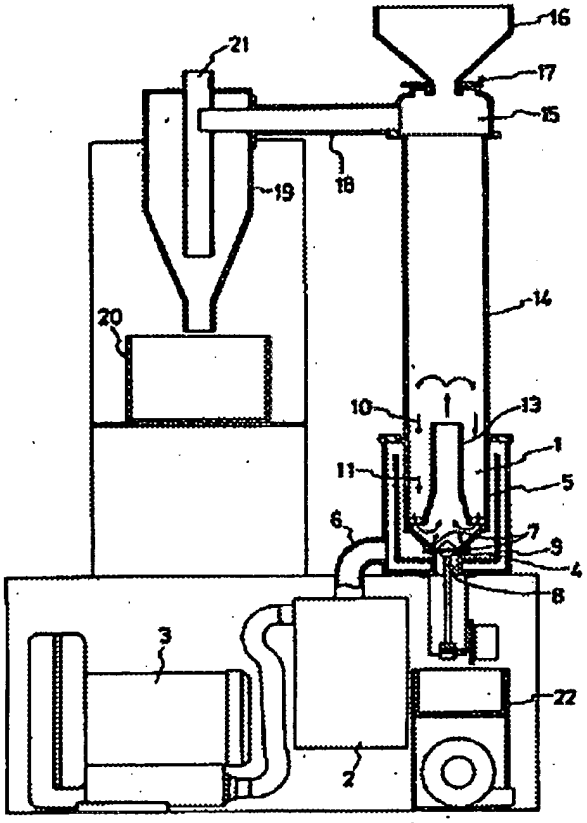

Figure 1